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Russia and NATO: Increased Interaction in Defense Research and Technology

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Overview

As a member of both the Partnership for Peace and the North Atlantic Treaty Organization (NATO)–Russia Council (NRC), Russia enjoys remarkable status in an alliance formed principally to counter Soviet aggression. Active participation in one additional element of NATO—the Research and Technology Organization (RTO)—would offer unique opportunities to enhance relationships and mutual security. The RTO is the largest organization of its type in the world, has an extremely active program of work, and is eager to work with Russia.

Enhanced cooperation between NATO and Russia in defense-related research and technology would not be easy. Mistrust is an obstacle, as is difficulty communicating in English and French, the official NATO languages. Also, Russian economic weakness impedes consistent participation, particularly in events outside Russia.

NATO could reach out to Russia, offering sequential, specific opportunities and limited funding. These opportunities could include involving young Russian scientists and engineers in selected, defense-related research and technology projects; having a special ad hoc senior executive group identify a small number of flagship activities and report on progress to the NATO Conference of National Armaments Directors, the Military Committee, and the NRC; and inviting a few mid-level scientists, engineers, or technical managers to work directly with RTO staff in Paris, where they could assist in defining and providing support for specific elements of the RTO program of work.

If NATO vectors toward Russia in this way, Russia must respond by vectoring toward the Alliance. The key here is a more consistent and cooperative representation by Russia in the forums that are available to it. Russian representatives must also become more fluent in English and French to achieve meaningful dialogue. This is especially true at the technical, senior executive levels. Finally, Russia must respond promptly to these initiatives. The opportunities are there. Now is the time.

Neither the charter of the North Atlantic Treaty Organization (NATO) nor the formal statement by President Harry S. Truman transmitting the proposed draft treaty to the U.S. Congress for ratification named the Union of Soviet Socialist Republics (USSR). It was clear, however, that the principal purpose of NATO was to resist communist aggression. It should have come as no surprise, then, that the breakup of the USSR and the Warsaw Pact four decades later caused an identity crisis for the Alliance. Arguments were made that NATO had lost its purpose and should be dissolved. Concerns were expressed that offering membership to former Soviet allies, but not Russia, might provoke a conflict with Russia. It was obvious to many that special and very specific attention had to be given to this new situation.[1]

Thus, in 1991, almost as soon as the Berlin Wall came down, NATO created the North Atlantic Cooperation Council (NACC). The NACC assembled all the newly liberated countries in Europe, together with the Soviet Union, to sit around the same table with NATO nations. As former NATO Secretary General Lord Robertson later recalled, the unprecedented gathering was historic in an unexpected way:

> A rather dramatic moment took place at the first meeting of the NACC in NATO headquarters in Brussels, on the evening of December 20th, 1991. At a certain point in the evening, a messenger came into the room and whispered in the ear of the representative of the Soviet Union. He excused himself and left the room. A few minutes later, he returned. He took his chair, and asked for the microphone. He announced that he could no longer speak for the Soviet Union, as the Soviet Union had, in the past few minutes, dissolved. He would henceforth represent only Russia.[2]

In an attempt to resolve the uncertainty about the future of NATO, the Alliance began the Partnership for Peace (PFP) program in 1994. More than 20 countries, including Russia, joined the program. The PFP provides for joint military planning and exercises and other activities (including cooperation in defense research and technology) with NATO members. Over time, many of the Partners have become members of NATO.[3]

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Areas of NATO-Russia Cooperaton

Terrorism. Russia and NATO Allies are developing and keeping under review joint assessments of specific terrorist threats in the Euro-Atlantic area. They have agreed to submit the ideas put forward at these conferences to the "20," to identify concrete proposals for cooperation in this area, moving beyond the theoretical to the practical.

Defense Reform. [There is] a need to transform our military structures from their bloated Cold War incarnations, equipped for traditional territorial defense, to smaller, better equipped, more rapidly deployable forces, geared toward responding to terrorism and other contemporary threats. These include expanding the Moscow-based NATO-Russia retraining center, which provides assistance to former Russian military personnel to transition to civilian life; examining areas for defense industry cooperation; developing a work plan for increased logistics cooperation; sharing experience of force planning aspects of defense reform; establishing a fellowship at the NATO Defence College in Rome for Russian defense planners; setting up a fund to assist with the destruction of landmines; and assisting in the management of Russian military nuclear waste.

Search and Rescue at Sea. Following the loss of the submarine Kursk in August 2000, NATO Allies and Russia intensified joint efforts in the field of search and rescue at sea. A series of cooperative activities associated with submarine crew escape and rescue were launched, which have fostered extremely positive relationships and practical results that will benefit submarine operators from NATO member states, Russia, and other nations.

Interoperability. Efforts to enhance interoperability—the capacity for NATO and Russian forces and equipment to work together against shared threats—link much of the cooperative work in the NRC, from civil emergency planning and response to theater missile defense. Cooperation in training also includes increased attendance at counterpart defense colleges and educational institutions, language training, and seminars. Greater cooperation on logistics could also enhance interoperability between NATO and Russian forces.

Source: Excerpts from General Harald Kujat, former Chairman of the Military Committee of NATO and the NATO-Russia Council, published in *Krasnaya Zvezda*, an organ of the Russian Ministry of Defense, December 25, 2002.

The true basis for the development of a strong and durable partnership between NATO and Russia was provided by the 1997 Founding Act on Mutual Relations, Cooperation, and Security, which expressed a joint commitment to build a lasting and inclusive peace in the Euro-Atlantic area. This act established the Permanent Joint Council (PJC), where Russia met with all NATO members to discuss common security concerns, work toward mutual understanding and, where possible, cooperate. A new phase was opened with the establishment of the NATO-Russia Council (NRC) at the NATO-Russia Summit on May 28, 2002, in Rome. This new body, which replaced the PJC, brought together the 19 member countries and Russia to identify and pursue opportunities for joint action. Unlike the PJC, where positions on all issues were coordinated among the 19 members before discussions with Russia, the NRC works on the principle of consensus. As Lord Robertson observed:

> The seating arrangements alone speak volumes. In the old PJC, a cumbersome troika shared the chair. We called it "19 plus 1." Russia called it "19 versus 1" . . . In the new NATO-Russia Council, there is no "19," and no "1." All participants sit as equals, in alphabetical order—great powers and small powers together. Russia sits between Spain and Portugal, fully comfortable as one of 20 participating nations. We meet monthly, in NATO Headquarters—a building that was on the target list of every Soviet nuclear missile commander. And I—the Secretary General of NATO—chair the meeting.[4]

The creation of the NRC, spurred by the tragic events of September 11, 2001, demonstrated the resolve of members to work closely as equal partners in areas of common interest and to stand together against common threats. Chaired by the NATO Secretary General, NRC meetings are held at least monthly at the level of ambassadors and military representatives, twice yearly at the level of foreign and defense ministers and chiefs of staff, and occasionally at summit level. Work focuses on all areas of mutual interest identified in the Founding Act.

The NRC is both a forum in which military issues can be discussed and a mechanism through which military cooperation can be intensified to meet new challenges. Under the terms of the Rome Declaration, military representatives of the NRC meet in Brussels at least once a month. In addition, chiefs of defense and chiefs of staff meet twice a year. Practical cooperation has been facilitated by the establishment of a permanent NATO Military Liaison Mission in Moscow.

Since 2002, NATO has embarked on a major effort of transformation. In that context, the relationship with Russia has intensified under the auspices of the NRC. Despite the ebb and flow of political relations with the events in Iraq and Afghanistan, practical tasks are being accomplished. In the context of military-to-military cooperation being developed between NATO and Russia, General Harald Kujat, former Chairman of the NATO Military Committee, emphasized such areas as the struggle against terrorism, defense reform, search and rescue at sea, exercises and training, and logistics.

In addition, progress is being made in developing a cooperative regime in theater missile defense (TMD). In June 2002, the NRC established the TMD Ad Hoc Working Group at ambassadorial level as a dedicated body to carry forward the technical work of the

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TMD cooperation initiative. To better address the many challenges involved, the work is divided into five areas of activity: terminology, experimental concepts, joint concept of operations, training and exercises, and systems capabilities. Each of these elements is addressed by a dedicated Support Working Team composed of experts from the various countries, military authorities, NATO agencies, and the International Staff in NATO Headquarters.[5]

Russian Defense Research and Technology

Russia has a distinctive approach to research and technology that traces to the evolution and dominance of the Russian Academy of Sciences. In 1724, an Imperial Academy of Sciences was created by order of Peter the Great to help modernize and strengthen Russia. It drew many prominent European mathematicians and scientists, including Leonard Euler and Nicolas and Daniel Bernoulli, and remained an intellectual center of international renown through many regimes and under many names.[6] The Academy is the leading center of fundamental research in the natural and social sciences in the Russian Federation and employs the best scientific minds of the country. Members enjoy immense prestige and privileges. Unlike members of many Western academies, the members of the Russian Academy of Sciences are full-time employees of the Academy.

Funded entirely by the government of the Russian Federation, the Academy exercises control over the activity of institutes, laboratories, and other bodies in fundamental research and training of scientists. It also is responsible for promoting international cooperation and coordinating international projects. During the Soviet era, the Academy was the central scientific organization of the Soviet Union, with research and development (R&D) capabilities in Russia and the other 14 Soviet republics. The many research institutes of the Academy were responsible for conducting fundamental research, and the Academy ran much of the Soviet military R&D effort. Even today, about half the work of the Academy is devoted to military R&D.

In the first decade after the dissolution of the Soviet Union, restructuring of the Russian R&D system was driven to a significant extent by the nation's deep economic recession. The recession has contributed to a large decrease in Russian R&D (most of which is state funded) and a consequent major loss of scientific talent. About 11,000 to 12,000 scientists and engineers are reported to have emigrated; a similar number are working under contract outside Russia.[7]

Recent shifts in priorities indicate that military R&D is on the upswing. The external and internal brain drain appears to have slowed, and new military realities are demanding new investments. According to then-First Deputy Defense Minister Andrei A. Kokoshin, funding is available only to modernize arms already produced. A number of plants in the military industrial complex, however, will receive "guaranteed minimal state orders" for new weapons during that period. The 1997–2005 arms development program was to provide Russia with the capability to manufacture "weapons that have no equivalent in the world," Kokoshin assured members of parliament.[8] Thus, it seems that the Russian military R&D establishment is overcoming the decline from the end of the Cold War and is ready to reestablish itself at a new and perhaps more efficient level. It remains to be seen whether a new spirit of openness can overcome the previous attitude of secrecy so that cooperation with NATO is possible.

The Research and Technology Organization

Within a few years of its inception in 1949, NATO created its first organization devoted to collaboration on defense research and technology, the Advisory Group for Aerospace Research and Development (AGARD). Several years later, the Defense Research Group (DRG) was created. In 1997, NATO merged the AGARD and DRG to form the Research and Technology Organization (RTO), the largest and most technically advanced forum in the world for sharing defense-related research and technology. The RTO consists of a Research and Technology Board, a Research and Technology Agency (RTA), 6 technical panels, the NATO Modeling and Simulation Group, and approximately 150 annual, specific technical activities.[9]

The technical activities of the RTO reflect the interests and activities of NATO members. The program of work is formulated annually by the technical panels for approval by the RTO Board. The program is then executed by teams of experts. It is noteworthy that essentially all activities, including personnel costs, travel, and equipment, are funded by member nations. The activities are coordinated daily through the RTA, which publishes results. The RTA budget of approximately $6 million leverages more than $15 billion in defense research and technology invested annually by member nations, almost all of which is available to NATO.

Russia has been involved in a variety of RTO programs, has attended RTB meetings open to Partners, and has participated in numerous RTO-sponsored symposia and other activities. The number of RTO activities open to PFP partners increased steadily during the initial years of the organization and has reached a steady state of approximately 90 activities per year; approximately 60 percent of all RTO activities are open to Russia. Russian participation, however,

Annual Activities of the NATO Research and Technology Organization (RTO)

The RTO program of work consists of approximately 150 annual activities, including:

- AGARDographs, major publications on a single, clearly defined technical subject and comprised of material generally agreed to be of lasting interest and value to the technical and military communities
- Cooperative Demonstrations of Technology, which showcase mature technologies in realistic environments primarily for the military communities
- Lecture Series, which disseminate state-of-the-art scientific knowledge in 2-day sessions to junior and mid-level specialists, scientists, and engineers
- Specialists Meetings, 2- or 3-day events that promote exchange of knowledge among an audience of specialists with selected speakers on an important scientific or applied topic
- Symposia, 3- or 4-day meetings that promote exchange of knowledge among a wide audience with selected speakers on an important scientific or technical topic
- Task Groups, which bring together technical teams from member nations to address a particular R&T area over a 1- to 3-year period, concluding with specific suggestions on the way ahead
- Technical Courses are educational activities aimed at transferring practical knowledge and recent field development through on-site instructor training
- Workshops facilitate intensive information exchange and focused discussion over a 2-to 3-day period on a specific topic among a limited number of invited experts

has not increased similarly. When the RTO has held activities in Russia, the Russian participation has been significant; when activities have been held elsewhere, Russian participation has been much more limited. Although a variety of activities—most notably Task Groups, which are a major growth area—are open to Russia, Russian participation has been limited almost exclusively to symposia and educational activities. The impact of restricted participation and the potential for enhanced interaction will be discussed later.

Opportunities for Cooperation

Of the 67 new activities initiated by the RTO in 2005, 45 are open to Russian participation through the Partnership for Peace program. Significant opportunities are especially available in applied vehicle technology, information systems technology, and modeling and simulation. It is also significant to note that 23 of the 45 opportunities for cooperation are in task groups, which can be especially beneficial in strengthening the relationships between NATO scientists and engineers and their Russian counterparts, and in providing Russia the opportunity to significantly influence and contribute to emerging technologies of value to NATO. By its nature, a task group is the most interactive, sustained activity undertaken by the RTO. It brings together scientists and engineers from member nations to look at a technical area in depth for 1 to 3 years and concludes with recommendations on the way ahead for both NATO and national programs. Some of the 2005 task groups that should be of particular interest to Russia—and where Russia has significant expertise—include: micro-electro-mechanical systems applications to gas turbines; advanced multi-sensor surveillance systems for combating terrorism; infrared/ultraviolet threat-warning sensors; and distributed learning and simulation to support NATO Allied Command Transformation (ACT), and the PFP Training and Education Enhancement Program.

RTO Workshops also offer excellent opportunities for Russia and NATO. These forums bring together some of the world's foremost experts to discuss and debate the state of the art of defense-related technologies with the aim of significantly broadening and enhancing individual and group knowledge of the subjects. Two workshops open to Russia in 2005—"Toward Recommended Methods for Testing and Evaluation of EV" and "ESV Based Visionic Devices and Military Applications of Multi-Robot Systems"—would benefit from active Russian participation.

Increased Cooperation in Defense R&T

Before discussing several issues and the way ahead, let us look at the context of the current situation. Several questions arise here: Why increase cooperation with Russia in defense-related research and technology (R&T)? What are the interests of NATO and member nations? Do NATO and member nations have sufficient common interests with Russia? Why hasn't cooperation in defense R&T worked better so far?

It is clearly fundamental that NATO wants to cooperate with Russia across a broad front. One only has to consider the Alliance's near-continuous outreach. Because RTO work tends to be on the levels of basic and applied research, cooperation is relatively nonthreatening, forms a basis for increasing knowledge of all parties involved, and could form the basis for a more cooperative spirit among all parties across a broader spectrum of activities. Couple this with the fact that Russia has clearly retained outstanding capability in defense-related technologies, and the potential benefit to all parties is apparent.

Selected Activities of the 2004 RTO Program of Work

Applied Vehicle Technology. This panel conducted a symposium on Functional and Mechanical Integration of Weapons with Land and Air Vehicles; a Specialist Meeting on The Control and Reduction of Wear in Military Platforms; a Lecture Series on Critical Technologies for Hypersonic Vehicle Development; and a Task Group on Health Monitoring of Munitions.

Human Factors and Medicine. This panel featured a Lecture Series on Personal Active Noise Reduction; a Technical Course on New Issues in Operational Ophthalmology; a Workshop on Battlespace Visualization: Promises and Reality; and a Task Group on Virtual Environments for Intuitive Human-System Interaction.

Information Systems Technology. Topics included a Symposium on Building Coalition Capabilities and C4ISR Architectures; a Workshop on Visualization and the Common Operating Picture; another Workshop on Enhancing Information Systems Security Through Biometrics; and a Task Group on Network Centric Operations Security.

Sensors and Electronics Technology. This panel sponsored a Task Group on Sensors for Urban Operations; another Task Group on N-Dimensional Eyesafe LADAR Imaging; a Symposium on High Resolution Radar Signatures for Air Targets; and a Lecture Series on Radar Polarimetry and Interferometry.

Studies, Analysis and Simulation. Topics included a Cooperative Demonstration of Technology on Mission Training via Distributed Simulation; a Task Group on Exploring New C2 Concepts and Capabilities; and a Lecture Series on NATO Code of Best practice for C2 Assessment.

Systems Concepts and Integration. This panel featured a Task Group on Correlation Between Laboratory Testing and Field Trials of Multi-Spectral Camouflage Systems; another Task Group on System-Level Integration of Control Plus Automation; a Cooperative Demonstration of Technology in Sensors and Sensor Denial by Camouflage, Concealment and Deception; and a Workshop on Multi-Sensor Fusion Techniques and Architectures for Amphibious Operations.

Modeling and Simulation Group. Activities included a Task Group on Implementation of HLA Compliance Certification within NATO and NATO nations; another Task Group on Modeling and Simulation Tools for Early Warning Identification of Terrorist Activities; a Symposium on Modeling and Simulation to Address NATO's New and Expanding Military Requirements; and a Task Group on Urban Combat Advanced Training Technology.

All nations involved, including Russia, will benefit from open dialogue and discussion on defense-related technologies in the form of an increased knowledge base. There also will be opportunities for individual scientists and engineers to become better acquainted over time, thus building trust. Increased trust can pay off by increasing understanding of cultures, customs, and thought processes—which may open new ways of solving technical problems. Over the long term, individuals involved may also move to positions of increasing responsibility and have the opportunity to cooperate in other areas, including political relations.

NATO and Russia clearly have many common interests in defense-related technologies. Our militaries face common problems, most notably defense against terrorism and the overall transformation of military forces, doctrine, and tactics from a Cold War model to one that can be more responsive to current and projected threats. Cooperation in defense research and technology poses relatively low risks to the parties, because application of the technologies is long-term in nature and creates no immediate military threat.

There are multiple reasons why better cooperation in defense research and technology has not occurred to date. Russia still does not trust NATO and member nations, and the eastward expansion of NATO exacerbated Russian concerns. Conversely, the newest members do not trust Russia and show little interest in being more involved with it under an RTO umbrella. The Russian economic situation also continues to be an obstacle to increased cooperation; the costs associated with almost all RTO activities are funded directly by member nations, which presents a particular problem for Russia. Finally, Russian concerns over intellectual property rights and NATO's lack of understanding of complex Russian laws, rules, and regulations in regard to exchanging pre-competitive scientific information can be stumbling blocks that require education of, and by, all parties involved.

Practical Issues

More than 40 years of Cold War have left a residue of suspicion on both sides of the former Iron Curtain. Fortunately, this is less true of scientists and engineers, especially when purely technical subjects are being discussed. The technical excellence of Russian scientists and engineers and their desire to interact with international colleagues are positive forces in building and enhancing dialog and communication with the NATO nations. Unfortunately, language is a substantial impediment to cooperation.

Russia lacks consistent ability in English and French, the official languages of NATO, among scientists, engineers, and technical executives. (And Russian language ability is almost nonexistent among NATO scientists, engineers, and executives.) The lack of fluency in these languages is particularly awkward when one considers that the majority of Russians involved with NATO—or perhaps more importantly those who could be involved but are not—are senior personnel who are clearly uncomfortable attempting to communicate in languages in which they have little or no skill.

NATO member nations typically have their most senior defense research and technology (R&T) authorities serving as members of the Board, senior executives with significant responsibilities in national defense laboratories serving on the panels, and senior scientists/engineers serving on symposia, task groups and other level-3 activities. It has been very difficult to get Russia to identify and make available appropriate senior technical executives responsible for defense R&T for participation in RTO activities at the Board and panel levels. Some of the difficulty is perhaps due to a lack of Russian understanding (or acceptance) that the sole interest of the RTO is defense R&T.

The lack of response is also perhaps due to a defense organizational structure in Russia that not only is dissimilar to the typical structures in Europe and North America, but also has had limited stability. RTO activities and the associated costs of salary, personnel, travel, and equipment are funded mainly by member nations. Unfortunately, Russia continues to struggle with the costs of doing business with NATO.

The Way Ahead

The Soviet Union had a very strong military technology base, much of which still exists in Russia. Russian solutions of technical problems were robust, exceedingly clever, and often based on different choices of technical systems. Recently, Russian leadership has recognized the need to reverse a decade-long decline, salvage vast intellectual potential, and increase military R&D investments. Russian strengths certainly include missiles and space launch vehicles, radar, aircraft, tanks, and submarines. Their abilities in the underlying technologies of materials, structures, aerodynamics, and propulsion are truly outstanding, as is their ability in fundamental mathematics, which is the foundation of information technology. Russian mathematicians and scientists also have excelled in explaining the physics of technical phenomena using eloquent mathematical tools rather than numerical solutions.

Improving relationships between NATO and Russia in defense research and technology clearly revolves around people and programs. Several steps could be taken now in these areas that have significant potential for improving the current situation. Recognizing that much of the distrust between NATO and Russia is generational in nature, efforts should be made by both sides to identify projects that are amenable to cooperative work by younger engineers and scientists. To this end, each technical panel within the RTO could identify at least one activity for a 2006 start (preferably a task group), work closely with the RTA Partnership for Peace executive to identify appropriate Russian institutions that employ younger scientists and engineers in the identified technical areas, and strongly encourage these institutions to make some of their most capable young people available to participate. Younger Russian scientists generally recognize the need to learn English because of their professional exposure to scientific conferences and would be more comfortable participating in RTO meetings. Recognizing that a shortage of funds may be a barrier to Russian participation, some modest funding, especially to support travel of the young scientists and engineers, could perhaps be made available by NATO.

Assuming that the above activities were successful, the RTO, working with Russia, could next identify a few flagship activities to be pursued jointly in the near term. Although a very wide variety of

possibilities exist, attention might be given initially to information technology and aerospace medicine. These are areas where Russian expertise is respected and the RTO program of work is exceptionally strong. In addition, the work could be of a fundamental research nature, but with clear defense relevance. Unlike the task groups that were mentioned earlier for the younger scientists and engineers, these flagship activities would be broader in scope and would seek to attract a significant number of mid- and senior-level scientific and engineering personnel from the NATO nations and Russia. Also, unlike other RTO activities that are open to Partners, these activities would be specifically tailored to Russian expertise (although other Partner nations might also participate). A workshop format, utilizing large and small groups interactively, may be the best format to enhance dialogue. A clear mandate should be to produce a report with emphasis on the way ahead.

Finally, following the success of the first two initiatives, the RTA could perhaps invite Russia to provide a few mid-career scientists and engineers to work with RTA staff for a trial period of 1 year. These individuals could be assigned to work directly for Panel Executives in technical areas of highest mutual interest to NATO and Russia. Immersion in the broad scope of RTO activities on a daily basis could help Russia develop a much better understanding of the NATO research and technology program and become more active in it. In addition, NATO could gain a much better understanding of Russian defense research and technology and the institutions involved. If Russia or NATO judge this broad option to be too large a step, the Russian personnel could still be identified and assigned, but the scope of the interaction could be initially limited, for example, to NATO's Defense Against Terrorism program, which is of great interest to both parties. Security might also be an issue, since the Russians could not be granted NATO security clearances.

Conclusion

The North Atlantic Treaty Organization and Russia have much to offer each other in defense-related research and technology. Unfortunately, the pace of cooperation has been erratic and the results uneven. Proactive steps must be taken by both sides. Basic and applied defense-related R&T is relatively nonthreatening to all parties and creates cooperative avenues that can be very significant in a world of asymmetric threats. These activities offer mechanisms to create more significant political and military cooperative ventures as scientific understandings of new phenomena are created and implemented into military operations. The opportunities are there. Now is the time.

Notes

[1]"With her nuclear arsenal, her 11 time zones, her 150 million citizens, and her borders stretching from the Caucasus through Central Asia and the Far East, Russia's fate remains vital to the security of the Euro-Atlantic community. Nothing could be of more long-term benefit to our common security than for Russia to take her rightful place as a full, trusting and trustworthy member of the Euro-Atlantic community." "A New Russian Revolution: Partnership with NATO," speech by NATO Secretary General Lord Robertson, Royal Society of Edinburgh, December 13, 2002.

[2]Ibid.

[3]In 1998, the Czech Republic, Hungary, and Poland joined NATO. In 2004, Bulgaria, Estonia, Latvia, Lithuania, Romania, Slovakia, and Slovenia joined, raising membership to 26. All of the non-Soviet members of the former Warsaw Pact are now in NATO.

[4]Lord Robertson.

[5]Robert Bell, Assistant Secretary General, Chairman, NATO Russia Council Ad Hoc Working Group on Theatre Missile Defense, "Ballistic Missile Threats: A NATO-Russia Strategic Challenge," *Krasnaya Zvezda*, February 27, 2003.

[6]It became the Russian Academy of Sciences in July 1917, under the Aleksandr Kerensky government, then the USSR Academy of Sciences in 1925. In 1934, it moved from St. Petersburg to Moscow. In December 1991, it regained its pre-Bolshevik name, the Russian Academy of Sciences. A concise history of the Academy is available on the Academy Web site at <http://www.pran.ru/eng/history/20021211024821history.html>.

[7]William C. Boesman, "Research and Development in Russia: An Important Factor for the Future" (Washington, DC: Congressional Research Service, August 24, 1998).

[8]Richard F. Staar, "The Bear Sharpens Its Claws," *Hoover Digest*, no. 4 (Stanford, CA: Hoover Institution, 1997).

[9]For a detailed description of the RTO, see Donald C. Daniel and Leigh C. Caraher, "NATO Defense Science and Technology," *Defense Horizons* 24 (Washington, DC: Center for Technology and National Security Policy, March 2003).

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